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**MANUFACTURING METHOD OF RED RICE MALT WHICH CONTAINS  
LARGE AMOUNTS OF HYPOTENSIVE CONSTITUENT**

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**MANUFACTURING METHOD OF RED RICE MALT WHICH CONTAINS LARGE AMOUNTS OF HYPOTENSIVE CONSTITUENT**

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(57) [Abstract]

[Problems to be Solved by the Invention]

To obtain a red rice malt containing a large amount of  
microbial cells as an index of hypotensive activity (amount  
of glucosamine) and a high content of g-aminobutyric acid  
(called GABA below) and provide its production method..

[Means to Solve the Problems]

This method for producing a red rice malt is to use a  
polished rice containing at least one kind of soybeans,  
wheats and germs, and producing the rice malt by adding  
water to adjust the water content becoming 55% or more at  
the completion of its production.

[Claim(s)]

[Claim 1]

rice malt it does manufacturing method. of red rice malt which includes hypotensive component which designates thing which inside soybean, wheat and the germ, uses polished rice which includes at least 1 kind make as rice malt starting material and in order make for moisture content at time of rice malt end to become 55% or more, water addition caring, make as feature mainly

[Claim 2]

Make at time of rice malt start, or make manufacturing method. of red rice malt which includes hypotensive component which is stated in Claim 1 which designates that vitamin B<sub>6</sub> is added in rice malt time as feature mainly

[Claim 3]

red rice malt. which is acquired with method of Claim 1 or 2

[Claim 4]

extract or fabricated article. which acquire red rice malt of Claim 3 as the starting material

[Description of the Invention]

[0001]

[Technological Field of Invention]

this invention, cell mass quantity which is an index of hypotensive effect (glucosamine quantity), and the; ga - amino butanoic acid regards red rice malt and its production method where (Below, GABA you call) content is high.

[0002]

[Prior Art]

red rice malt in cereal monas deposit being attached strain with rice malt which propagates, with, China, Taiwan, etc., is utilized as red sake, old age sake, red milk decaying or other brewing starting material "Shoushokukatsuchi" "Kenhisoui" or other effect is known in addition as natural

medicine from ancient times.

Rijichin "Honsoumoumoku" (1590).

Furthermore, recently these inventors you discovered strong hypotensive effect (Patent No. 1669591 and Patent No. 1863899) and cholesterol decreasing action to be observed, coupled with increasing of health inclination, widely it is utilized, with foodstuff field such as addition, and various health food to staple food such as unhulled rice vinegar, miso, soy sauce or other brewing foodstuff and bread and noodles.

[0003]

Revelation is verified by 2 weeks uptake doing per day red rice malt 27 g suitable red rice malt extract as hypotensive effect of red rice malt for hypertension patient, and (Inoue et al.; Medicine and Pharmacology Vol. 30 No.1 page 231 - 240), in addition, the significant hypotensive effect is verified by 6 month period long period uptake doing per day red rice malt 9 g suitable red rice malt extract.

(Inoue et al.; Nutrition Study Magazine, Vol. 53, Issue 4 page 263 - 271).

Tsuji et al.; Nutrition Magazine, 50, 285 (1992), in addition, as for this hypotensive effect, propagation of microbe advancing, about those where cell mass quantitative (glucosamine quantity) of rice malt has become many strong thing has become clear. In addition, as for one component of hypotensive effect of red rice malt with GABA

(Nihon Shokuhin Kogyo Gakkaishi Vol.39, No. 9, page 790 - 795).

red rice malt which is offered from until recently is glucosamine quantitative 3 - 8 mg/g, GABA content 20 - 50mg /100g.

[0004]

On one hand when red rice malt is utilized to foodstuff, if addition quantity of red rice malt loses is made many, pharmacological effect tendency which impairs the foodstuff original flavor of those which increase becomes strong, in addition addition quantity little, as for flavor expectation

to pharmacological effect of those which are not impaired becomes thin.

Really, in addition regarding bread and noodles regarding the brewing foodstuff with red rice malt as portion of brewing starting material, it adds directly as the foodstuff material, but effective necessary amount of red rice malt uptake it is not easy always with these foodstuff to do.

Because of that, brewing foodstuff and staple food which are contained at high ratio practical, hypotensive active ingredient it is such as red rice malt, red rice malt where GABA content is many is desired namely cell mass quantity (glucosamine quantity) and at point where with the broad foodstuff field.

[0005]

But monas deposit being attached microbe type quite fecundity is weak, with the conventional make rice malt condition glucosamine quantity which it can be satisfied, the red rice malt of GABA content is not acquired.

In addition, if make in rice malt starting material, culture medium starting material which is used with the conventional liquid culture is added, growth becomes good, you can expect also that the cell mass quantitative (glucosamine quantity) increases, but it is not case that always GABA content increases simultaneously, conversely peptone and as for extract or other uses problem where cost becomes high occurs.

[0006]

[Problems to be Solved by the Invention]

Like above you consider to actual condition, this invention uses safe natural starting material with inexpensive, cell mass quantity (glucosamine quantity), and GABA content it is something which offers novel method which increases.

[0007]

[Means to Solve the Problems]

Therefore, as for this invention, inside soybean, wheat and the germ, it uses polished rice which includes at least 1

kind make as rice malt starting material and in order make for moisture content at time of rice malt end to become 55% or more, water addition caring, make rice malt it does, Make at time of rice malt start, or make it regards manufacturing method of the red rice malt which includes hypotensive component which possesses feature in adding the vitamin B<sub>6</sub> in rice malt time mainly, furthermore, red rice malt, which is acquired with these method it regards offer of extract or fabricated article which acquire red rice malt which catches as starting material.

[0008]

[Embodiment of the Invention]

Make rice malt starting material of this invention, inside soybean, wheat and the germ, is something which adds at least 1 kind to polished rice.

As for these with conventional make rice malt starting material or foodstuff material, using for the oral, there is not a hindrance, it is ideal in utilization to foodstuff and make-up etc.

polished rice which is used for this, yield calls rice of 92% or less with hulling, also configuration like fragmenting rice includes.

It can use for example rice germ and wheat germ as for example roasting wheat, germ as the for example defatted soybean, wheat as soybean,, in addition, selecting these appropriately, the alone, or mixing and before adding to polished rice which you inscribed it uses.

In addition, when as for soybean addition quantity is many as starting material composition, because you cannot expect Effect of Invention and become, preferably 20percent by weight or less, furthermore it makes preferably 10percent by weight or less.

If considering amount used of soybean, it should have decided the other starting material composition.

Furthermore, as for vitamin B<sub>6</sub>, make adding 0.001 percent by weight or more, preferably 0.002 - 0.02 percent by weight extent at time of rice malt start, or in time make when rice malt it does, high effect is acquired.



[0009]

water addition care make mixture, it points to operation of undoing to the uniform at time of rice malt including water, condition in the this invention 55% or more, preferably 60% or more, of eye which is more than moisture content 45 - 55% at time of conventional water addition condition, for example make rice malt end furthermore makes preferably 70% or more.

As for adjustment of moisture content, you divide into several times in for example make rice malt time, you can list method which adds water of suitable amount, but while verifying water-absorbed state, moisture content of rice malt, it is desirable to raise moisture content gradually.

Furthermore, as for this moisture content, it is something which called value which was measured due to infrared lamp heating and drying method (Foodstuff Analysis Methods, page 17 - 19, 1982, by:Nippon Shokuhin Kogyo Association, Foodstuff Analysis Methods, Committee Compilation, published by Koran) in heating and drying method it sought with below-mentioned formula.

moisture content (%) = (red rice malt weight) - (absolute dry weight) / red rice malt weight X 100 (%)

In addition, other make rice malt condition following to conventional make rice malt method, if it should have done, generally, 20 - 40°C with, culture does 2 - 14 day red koji-yeast in aerobic.

As red koji yeast, if it is something which belongs to monas deposit (Monascus) being attached, it is good any microbe, for example, Monascus purpureus (Monascus purpureus), Monascus anka (Monascus anka), the Monascus pilosus (Monascus pilosus) and can list these variety, mutant, etc.

[0010]

Be able to utilize red rice malt of this invention, in all application of public knowledge as use method of rice malt, not only as starting material of brewing foodstuff it is possible to use, with conventional method, inactivation things such as, dried matter, dried fragment ones and your extract, extract concentrate, extract powder or other time

microbe and enzyme as fabricated article.

for example it dries inactivation things such as rice malt or microbe and the enzyme which are acquired with drying method of public knowledge, powder fragment doing with desire, it can make things such as rice malt dried matter and powder.

In addition, rice malt which is acquired or also to extract with the for example water-containing alcohol, acetone or other solvent concentration and drying doing with desire, with conventional method, to make the concentrated extract or extract of powder it is possible dried matter or powder.

This way, this invention cell mass quantity (glucosamine quantity), GABA content is something which can offer red rice malt which increases by producing with the above-mentioned condition.

In addition, furthermore 40 - 70 heating red rice malt which is acquired with method a this way, 1 hour or more external air blocking, it is possible by treating in anaerobic, it closes airtight, encloses carbon dioxide gas, nitrogen gas,, etc., ordoes gas substitution,, etc., furthermore to raise effect.

Below, listing Working Example, furthermore you explain this invention in detail, but this invention is not something which is limited in these.

Furthermore, moisture content is something which was measured due to the infrared lamp heating and drying method which was inscribed make with respect to rice malt at time of rice malt end, before.

[0011]

[Working Example 1]

Soaked rice 30 g which includes defatted soybean 5percent by weight and roasting wheat 20 percent by weight as starting material was inserted in erlenmeyer flask, 125°C with 30 min steaming sterilization after doing, red rice malt (strain name : *Monascus pilosus* IFO 4520) inoculation was done.

This in order to become high moisture content, at time of inoculation and make in rice malt 3 days in 7 ml, 5 days

water addition 2 ml at a time was cared in 3 ml, 6 days and 7 days, 30°C with 8 day make rice malt were done.

Furthermore in above-mentioned make rice malt 3 days and 5 days, vitamin B<sub>6</sub> was added 0.01 percent by weight at a time as vitamin B<sub>6</sub> added set.

As control, soaked rice 30 g was designated as starting material, water addition condition at time of inoculation make rice malt was done in same way in 4 ml, make rice malt 3 days as 4 ml.

Make after rice malt ending, 110°C with it did 20 min inactivating treatment, with forced air dryer, 60°C with, dried in moisture content 10% or less and made red rice malt sample, measured cell mass quantity (glucosamine quantity) and GABA content.

following to Agricultural and Biological Chemistry (0002 - 1369, ABCHA6), 41, 619 (1977), it did. As for measurement of cell mass quantitative (glucosamine quantity), method of Sakurai, et al.

In particle diameter 297 µm or less agitated extracted in red rice malt powder which powder fragment is done including sulfosalicylic acid of 7% concentration, measurement of GABA content with mill followed to conventional method with amino acid analysis machine (JEOL JLC-300) and analyzed.

Each rice malt fraction final moisture content, cell mass quantity (glucosamine quantity) and GABA content is inscribed to the Table 1.

From Table 1, in comparison with control group, high moisture defatted soybean added set had increased, cell mass quantity (glucosamine quantity), also GABA content rapidly, with the vitamin B<sub>6</sub> added set furthermore GABA content increased.

[0012]

[Table 1]

1. Rice Malt Raw Materials
2. Malting Conditions
3. Final Moisture Content (%)
4. Glucosamine Content (mg/g)
5. GABA content (mg/100 g)
6. Soaked rice only
7. Normal
8. 5% defatted soybeans and 20% roasted wheat added
9. High water ratio
10. 5% defatted soybeans and 20% roasted wheat added
11. High water ration with vitamin B<sub>6</sub> added

製麹原料	製麹条件	最終水分率 (%)	グルコサミン量 (mg/g)	GABA含量 (mg/100g)
浸漬米のみ	通常	48.2	5.7	35.5
5%脱脂大豆、 20%炒り小麦添加	高水分率	71.9	13.2	73.3
5%脱脂大豆、 20%炒り小麦添加	高水分率、 ビタミンB <sub>6</sub> 添加	70.9	17.6	92.0

[0013]

#### [Working Example 2]

Soaked rice 30 g which includes soaked rice 30 g, or defatted soybean 5 percent by weight as the starting material was inserted in erlenmeyer flask, inoculation of steaming sterilization and red koji-yeast was done in same way as Working Example 1.

At time of the:water addition condition 1; inoculation which in order to become various moisture content condition, with the following condition at time of inoculation and make

water addition care these in rice malt time, 30° with 8 day solid culture it does and make in rice malt 3 days at time of 4 ml additions and water addition condition 2; inoculation and make in rice malt 3 days at time of 5 ml additions and water addition condition 3; inoculation and make in rice malt 3 days at time of 6 ml additions and water addition condition 4; inoculation make in rice malt 3 days in 7 ml, 6 days 2 ml additions.

Make after rice malt ending, you inserted rice malt in polypropylene sack, closed airtight and 50° with did 1 hour heating treatment.

This, 110° with to do 20 min inactivating treatment in same way as Working Example 1, with the forced air dryer, 60° with, drying in moisture content 10% or less, it made red rice malt sample, cell mass quantity (glucosamine quantity) and measured GABA content.

Each rice malt Ku final moisture content, cell mass quantity (glucosamine quantity) and GABA content is inscribed to the Table 2.

As Table 2 compared to also defatted soybean addition and un added set, make the final moisture content high, cell mass quantity (glucosamine quantity), also GABA content is tendency of increase, but with final moisture content 60% vicinity cell mass quantity (glucosamine quantity), also GABA content with state of ceiling, effect of defatted soybean addition could verify the defatted soybean un added set clearly.

[0014]

[Table 2]

1. Rice Malt Raw Materials
2. Water Addition Conditions
3. Final Moisture Content (%)

製麹原料	加水条件	最終水分率 (%)	グルコサミン量 (mg/g)	GABA含量 (mg/100g)
精白米のみ	1	48.2	5.7	35.5
精白米のみ	2	53.9	7.9	43.4
精白米のみ	3	58.7	7.2	49.0
精白米のみ	4	63.7	8.7	48.2
5%脱脂大豆添加	1	46.6	7.3	31.4
5%脱脂大豆添加	2	51.2	8.4	53.0
5%脱脂大豆添加	3	56.5	9.8	68.4
5%脱脂大豆添加	4	62.0	14.1	94.8

4. Glucosamine Content (mg/g)
5. GABA content (mg/100 g)
6. Soaked rice only
7. Soaked rice only
8. Soaked rice only
9. Soaked rice only
10. 5% defatted soybeans added
11. 5% defatted soybeans added
12. 5% defatted soybeans added
13. 5% defatted soybeans added

[0015]

[Working Example 3]

Furthermore effect of high moisture was examined concerning the soaked rice which includes defatted soybean 5percent by weight as starting material.

In defatted soybean added set of Working Example 2, with following condition at time of the inoculation and make water addition it cared in rice malt time, 30°C with 8 days solid culture did: At time of water addition condition 1; inoculation and make in rice malt 3 days in 7 ml, 6 days at time of 2 ml additions and water addition condition 2; inoculation and make in rice malt 3 days 7 ml, 5 days, on the 6 days, on 7 days at time of 2 ml additions and water addition condition 3; inoculation and make in rice malt 3 days in 7 ml, 5 days 3 ml, 6 days, on 7 days at time of 2 ml additions and water addition condition 4; inoculation make in rice malt 3 days 7 ml, 5 days, on 6 days in 3 ml, 7 days

2 ml additions.

Make after rice malt ending, heating treatment, inactivating treatment and drying were done in same way as Working Example 2, cell mass quantity (glucosamine quantity) and the GABA content was measured.

Each rice malt fraction final moisture content, cell mass quantity (glucosamine quantity) and GABA content is inscribed to the Table 3.

As been clear from Table 3, as moisture content condition is made high, furthermore cell mass quantity (glucosamine quantity), also GABA content increased.

[0016]

[Table 3]

1. Rice Malt Raw Materials
2. Water Addition Conditions
3. Final Moisture Content (%)
4. Glucosamine Content (mg/g)
5. GABA content (mg/100 g)
6. 5% defatted soybeans added
7. 5% defatted soybeans added
8. 5% defatted soybeans added
9. 5% defatted soybeans added

製麹原料	加水条件	最終水分率 (%)	グルコサミン量 (mg/g)	GABA含量 (mg/100g)
5%脱脂大豆添加	1	66.3	13.1	85.5
5%脱脂大豆添加	2	68.4	16.7	103.3
5%脱脂大豆添加	3	74.3	17.2	142.3
5%脱脂大豆添加	4	76.3	22.0	159.4

[0017]

[Working Example 4]

It examined concerning defatted soybean content in starting material.

In order to become in same way as Working Example 1 inoculation and high moisture content of steaming sterilization, red koji-yeast making use of soaked rice 30 g which includes the defatted soybean of 5, 10, 20 and 50 percent by weight, it cared water addition, 30°C with did 8 day make rice malt.

Make after rice malt ending, heating treatment, inactivating treatment and drying were done in same way as Working Example 2, cell mass quantity (glucosamine quantity) and the GABA content was measured.

Each rice malt fraction final moisture content, cell mass quantity (glucosamine quantity) and GABA content is inscribed to the Table 4.

As been clear from Table 4, defatted soybean content with 5 - 20 percent by weight, cell mass quantity (glucosamine quantity), satisfactory numerical value acquired also GABA content, but with 50 percent by weight it deteriorates considerably.

[0018]

[Table 4]

1. Defatted Soybean Content (%)
2. Glucosamine Content (mg/g)
3. GABA content (mg/100 g)

脱脂大豆含量 (%)	グルコサミン量 (mg/g)	GABA含量 (mg/100g)
5	25.3	125.0
10	18.9	128.2
20	18.7	106.2
50	7.9	2.6



[0019]

[Working Example 5]

Effect of germ additions to (Effect of germ) starting material was verified.

In order to become in same way as Working Example 1 inoculation and high moisture content of steaming sterilization, red koji yeast making use of soaked rice 30g which includes the rice germ 10 percent by weight or wheat germ 5percent by weight, it cared water addition, 30°C with did 8 day make rice malt.

Make after rice malt ending, heating treatment, inactivating treatment and drying were done in same way as Working Example 2, cell mass quantity (glucosamine quantity) and the GABA content was measured.

Each rice malt fraction final moisture content, cell mass quantity (glucosamine quantity) and GABA content is inscribed to the Table 5.

As been clear from Table 5, effect where also rice germ, wheat germ is similar to defatted soybean was verified.

[0020]

[Table 5]

1. Rice Malt Raw Materials
2. Final Moisture Content (%)
3. Glucosamine Content (mg/g)
4. GABA content (mg/100 g)
5. 5% defatted soybeans added
6. 10% rice germ added
7. 5% wheat germ added

製麹原料	最終水分率 (%)	グルコサミン量 (mg/g)	GABA含量 (mg/100g)
5%脱脂大豆添加	71.6	17.7	121.8
10%米胚芽添加	73.4	18.9	110.0
5%小麦胚芽添加	73.6	23.3	118.2

[0021]

[Working Example 6]

Furthermore it roasted concerning soaked rice which includes the defatted soybean 5 percent by weight as starting material, verified effect of wheat or vitamin B<sub>6</sub> addition.

In order to become in same way as Working Example 1 inoculation and high moisture content of steaming sterilization, red koji yeast defatted soybean 5 percent by weight and making use of soaked rice 30 g which includes roasting wheat of each content, it cared water addition, 30°C with did 8 day make rice malt.

Make after rice malt ending, heating treatment, inactivating treatment and drying were done in same way as Working Example 2, cell mass quantity (glucosamine quantity) and the GABA content was measured.

In addition, make in rice malt 3 days and 5 days, adding 0.01 percent by weight at a time vitamin B<sub>6</sub> making use of soaked rice which includes the defatted soybean 5 percent by weight, make it did rice malt in same way, cell mass quantity (glucosamine quantity) and measured GABA content.

Each rice malt fraction final moisture content, cell mass quantity (glucosamine quantity) and GABA content is inscribed to the Table 6.

From Table 6, addition starting material rather than being a defatted soybean alone, furthermore cell mass quantity of large amount (glucosamine quantity), could acquire the red rice malt of GABA content by jointly using roasting wheat or vitamin B<sub>6</sub>.

[0022]

[Table 6]

1. Rice Malt Raw Materials
2. Final Moisture Content (%)
3. Glucosamine Content (mg/g)
4. GABA content (mg/100 g)
5. 5% defatted soybeans added
6. 5% defatted soybeans, 0.02% vitamin B<sub>6</sub> added
7. 5% defatted soybeans, 10% roasted wheat added
8. 5% defatted soybeans, 20% roasted wheat added
9. 5% defatted soybeans, 40% roasted wheat added

製麹原料	最終水分率 (%)	グルコサミン量 (mg/g)	GABA含量 (mg/100g)
5%脱脂大豆添加	71.8	20.1	127.0
5%脱脂大豆、0.02%ビタミンB <sub>6</sub> 添加	72.5	20.1	152.7
5%脱脂大豆、10%炒り小麦添加	73.3	22.8	153.0
5%脱脂大豆、20%炒り小麦添加	74.0	26.4	156.9
5%脱脂大豆、40%炒り小麦添加	72.6	24.0	152.7

[0023]

[Effects of the Invention]

With this invention, growth being satisfactory, cell mass quantity (glucosamine quantity) and red rice malt where GABA content increases could be acquired.

In addition, making use of this function, various foodstuff, fabricated article which is notformer acquired.